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ABSTRACT

The SRI Classroom Observation Instrument (COI) was used in evaluating the instructional models being tested by nine Follow Through (FT) sponsors in Spring 1971. The SRI COI has three major parts: a section for describing the physical environment, a Classroom Checklist, and a Five-Minute Observation Form. The principal question which the evaluation sought to answer was: Are there "planned variations," and, if so, which are effective for enhancing the social, emotional, and cognitive growth of children. Sixty-eight variables were used in the observation analysis to identify specific components of the different models. From comparisons on the 68 variables and on a five-factor profile, the nine sponsor approaches are different from each other, but there is evidence that each sponsor is, in part, successfully implementing his program. From master tapes containing all COI information, a data tape was generated containing all occurrences of the 68 variables throughout the FT groups (N=97) and the non-FT groups (N=26). Among the differences found between the FT and non-FT classes, the following are considered as being particularly important: (1) Children in FT classes experienced a wider variety of activities than children in comparison classrooms; (2) FT children more often engaged "independently" in a variety of activities than did non-FT children; (3) There was a higher proportion of adults, and thus more individual and small group instruction, in FT classrooms; (4) In FT classrooms, thought-provoking questions of adults were more often responded to with elaboration by the children; and (5) Adults in non-FT classes did more instructing in large groups. Nine tables present the study data. (DB)

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What Happens in the Follow-Through Program? Implications for Child Growth and Development

by

Jane Stallings, Ph.D.

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INTRODUCTION

The quality of education in the early years contributes to children's characteristics that affect how they are able to live their lives. Foremost among the characteristics that schools attempt to influence is the capacity for growth in learning. Toward this purpose the thrust of Follow Through (FT) has been aimed.

Learning, however, is broadly defined by the Follow Through concept to include cognitive or academic learning and, even more, to encompass learning to become a person who is competent emotionally, socially, and physically and thinks well of himself. To meet this challenge, FT sponsors* have created educational models that range widely from early emphasis on structured programs that require major attention to cognitive learning, to free open environments that encourage self-directed activity that may focus on a rich supply of stimulating materials and ideas. Both approaches are designed to lead to intellectual and social-emotional development, but to different degrees and with different time schedules.

In evaluating the success of FT models at any point along the way--in kindergarten, first, second, or third grade--it is necessary to use or develop instruments that measure what the models attempt to implement. This is no easy task when early education is conceptualized in many patterns.

Most previous evaluations of educational programs, especially evaluations of large-scale compensatory education programs, have depended primarily upon achivement tests in the evaluation of children. Such tests provide an academic measure that is limited in validity, due to inadequacies both in the tests and in the ability of young children as test-takers. A description of the actual events occurring in the classrooms has not been provided.

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*Eight FT sponsors were selected for observation: Far West Lab (FW), University of Arizona (UA), Bank Street College (BC), University of Oregon (UO), University of Kansas (UK), High Scope (HS), University of Florida (UF), Educational Development Center (ED), and New York University (NY).

In the evaluation of the national FT program, an observation instrument was designed to remedy the problem. The SRI Classroom Observation Instrument (COI) is an elaborate coding system that a trained observer in a classroom uses to record the setting, kinds of activities, and groupings in the classroom.

The language of this observation instrument was created specifically to describe the programs of eigth sponsors who had developed and experimented with instructional models and were invited to implement them in FT projects across the nation. Unlike earlier classroom observation instruments based on a single theory of effective teaching, the COI was designed to capture the relevant featues of each of the theoretical models being tested in FT. It therefore contains a larger number of codable events than earlier classroom observation instruments and, insofar as possible, is unbiased toward any one model program.

The instructional models were selected from those available to be as diverse as possible within the general guidelines of the FT program which aimed toward enhancing children's "life chances." Sponsors differed in their beliefs about the nature of the disadvantages the children suffered, the strategy for compensating them, and the time schedule or sequence in which various objectives should be accomplished. For example, both Engelmann, from the University of Oregon, and Gilkeson, from Bank Street College, designed their programs to help children become happy, confident, and knowledgeable. However in Engelmann's UO model, the immediate objective that the children master basic academic skills is emphasized, in the belief that success in school tasks would also promote confidence and self-knowledge, while Gilkeson's BC model emphasizes feelings of self worth, pride, and confidence as the immediate objective, on the assumption that curiosity, interest in learning, and interest in doing well in school will be enhanced and that achievement will naturally follow.

Each of the models implies that certain events and activities ought to occur or ought not to occur in classrooms. The COI was therefore designed, with extensive cooperation from the sponsors, to capture the events implied by their models. The important similarities and differences expected among sponsors' models are reflected in the COI.

The principal experimental question to which the FT evaluation was addressed is: Are there "planned variations," and, if so, which are effective for enhancing the social, emotional, and cognitive growth of children? In this context, the COI has several very important functions. The variables or frequencies of certain coded activities, groupings, and interactions can be used to discover whether the program that each sponsor intends to implement in classrooms is actually implemented. In addition,

classroom observation data can be used as independent variables in their own right, even without regard to program sponsorship. And we can ask the question: Which classroom processes overall are positively related to children's performance on achievement tests and to measures of attitude toward school and learning?

It is intended that data based on such assessments as the foregoing will assist school personnel in making knowledgeable decisions on which educational models or model components to select and use in the future.

The complete classroom observation procedure is explained later in this paper. In essence, local observers were trained and scheduled to observe for two full days in each of the classrooms selected for observation. In the spring 1971 data reported here, there were 97 classes in sixteen projects directed by sponsors. At each site, comparison classes were selected, a total of 26 such classes for spring 1971.

DESCRIPTION AND ADMINISTRATION OF THE INSTRUMENT

Contents of the COI

The SRI COI has three major parts: a section for describing the physical environment, a Classroom Checklist (CCL), and a Five-Minute Observation (FMO) form.

The CCL, sometimes referred to as the "snapshot," attempts to record a series of relatively static pictures (four an hour) of the distribution of adults and children among activities. Essentially, the CCL assesses (1) activities occurring, (2) materials used in activities, (3) grouping patterns, (4) teacher and aide responsibilities, and (5) child independence.

The FMO is completed four times an hour (i.e., following each CCL). It answers four questions: (1) Who does the action? (2) To whom is it done? (3) What is done? (4) How is it done? A complete unit of interaction is described when the coded replies to these categories are strung into a sentence structure format. The latter format, using interchangeable "parts of speech" or components, was developed with the help of Dr. Flanders from the University of Michigan. The "Who" and "To Whom" codes make it possible to designate the person or group of persons initiating or receiving an action. Figure 1 presents the codes used.

The 12 "What" codes refer to categories that survived several iterations of instrument review with consultants and sponsors' representatives. The codes preserve the distinctions that seem to be important in describing sponsors' classes, as well as the processes observed in non-FT classes. (Appendix 1 presents the operational definitions of processes.)

The first four items in the "How" code refer to the affective aspects of an interaction between people or with materials. The next six items specify the strategies the teacher used to control her classroom.

All were field-tested in all sponsor classrooms before being included in the COI. The last two "How" items, "concrete object" and "symbolic object," relate to instructional strategies employed by sponsors who prefer to have children learn first from experiences with concrete objects

KEY

R–Repeat **C–Cancel**

Who and To Whom

T – Teacher
A – Assistant/Aide
V – Volunteer

C – Child
D – Different Child
2 – Two Children

S – Small Group
L – Large Group
E – Everyone

M – Materials
O – Confusion

What

1 – Direct request
2 – Choice request
3 – Respond
4 – Teach, Inform

5 – Comment, Play
6 – Praise
7 – Acknowledge
7 – Help

8 – Cooperate
9 – Corrective feedback
10 – No response, Ignore, "I don't know"
11 – Refuse, Reject

12 – Observe
0 – Confusion

How

H – Happy
S – Sad
N – Negative
A – Angry

G – Guide to alternative
R – Reason
C – Control by praising
Q – Question

F – Firm
D – Demean
Th – Threaten
P – Punish

T – Touch
O – Object
Sy – Symbol

V – Verbal
N/V – Non verbal

FIGURE-1 CODES USED ON CLASSROOM OBSERVATION INSTRUMENTS

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before proceeding to experiences with symbols (ideas). Concrete and symbolic object materials can usually be observed in the methods used to teach arithmetic, for example, the use of blocks or weights so that children can comprehend that one block added to three blocks will balance four blocks.

The interaction "sentence" that results when the "Who, To Whom, What, and How" interactions are strung together is coded into a frame. A complete interaction sequence takes two or more frames and shows at least the initiation of an interaction and the response to it. An example of such an interaction and its recording is shown in Figure 2.

Quality Control and Reliability Checks

To ensure the proficiency of the observers and the use of uniform observation procedures at all observation sites, SRI classroom observation trainers traveled to each classroom observation community to perform a reliability check with each classroom observer. Before going into the field, the SRI trainers improved their own inter-rater reliability by conducting a series of simultaneous observations on video tape.

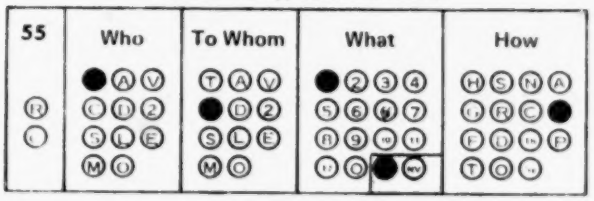
In each of the field checks, the SRI trainer and the classroom observer simultaneously coded eight 5-minute observations in the same classroom over a period of 2 hours. These observation forms and all other observation forms were sent to National Computer Systems (NCS) in Minneapolis for optical scanning.

To compensate for potential observer bias, each observer was required to code observations in non-FT comparison classrooms as well as FT classrooms and at each class level being observed.

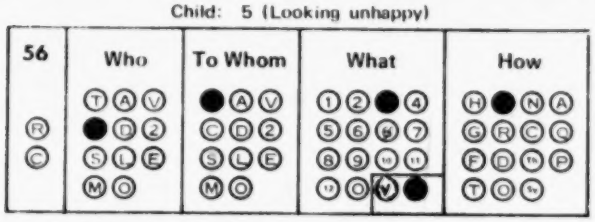
Reliability is a chronic problem in observations of natural situations. There are many sources of bias and error, particularly when observation occurs under conditions that require recording at rapid rates, observing complex stimuli, using highly structured procedures, and observing in settings where the observer cannot be physically insulated from the activities being observed.

In the observations conducted with the COI developed by Stanford Research Institute, all the above influences exist. Even when one invests heavily in observer training to ensure adequate preparation before observers are deployed, several influences can operate to reduce the reliability of data recorded:

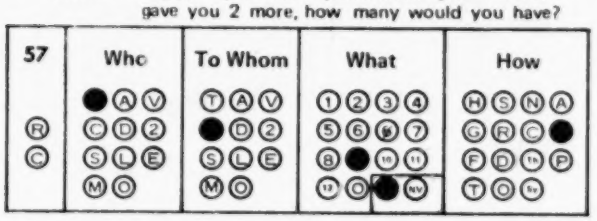
Teacher: Mary, what is 2 and 2?



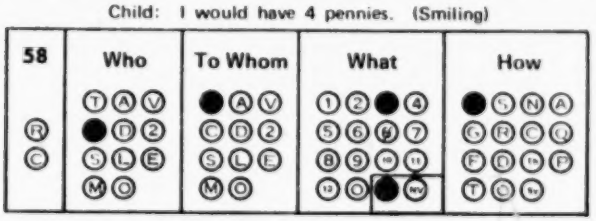
Child: 5 (Looking unhappy)



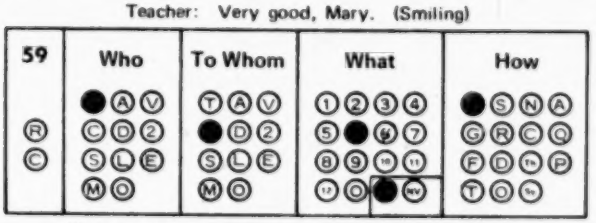
Teacher: Mary, if you had 2 pennies and your mother gave you 2 more, how many would you have?



Child: I would have 4 pennies. (Smiling)



Teacher: Very good, Mary. (Smiling)



Child: I have a whole jar full of pennies at home. (Smiling at everyone)

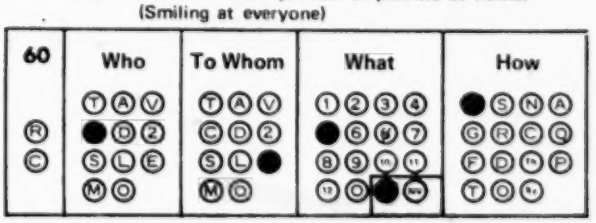


FIGURE -2 EXAMPLE OF CODED INTERACTION FROM CLASSROOM OBSERVATION INSTRUMENT

- Ambiguous or incomplete specification of the phenomena on which to focus.
- Coding judgments requiring inferences.
- A complex stimulus situation that distracts from sustained attention to elements.
- Recording (clerical) errors.

In classroom observations, the question of how to express reliability has no obviously best answer. Observations do not fit easily into approaches for estimating reliability of other measures, such as psychological and educational tests. For example, such test reliability models as the split-half technique, parallel forms, or test/retest are not appropriate.

SRI's approach to achieving reliability with the COI involved three main efforts, each of which complemented the others. The first was careful screening and selection of local observers, as already described. The second was intensive training of observers to criterion performance before assigning them to unsupervised observation. The third was performing frequent field checks of observer performance with trainer-supervisors deployed from Menlo Park. As will be seen, the problem of reliability is far from adequately solved. Nevertheless, the quality of the data appears acceptable for most of the variables that have been derived for analyses.

The evidence available at present for expressing the reliability of COI variables comes from instances in which a trainer-supervisor was paired in the field with a field observer and both observed the same classroom simultaneously and independently of one another. Percentage agreement between paired observers has been used as an index of data reliability. Table 1 shows a summary of results from eight pairings, all of which occurred in different project locations. As the table shows, the average percentage agreement achieved on a set of 68 variables* was 76.9%; on more than half the variables the index of agreement was greater than 81%.

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* See Table 2 for the numbering and description of the observation variables: 5 of the total of 68 did not occur in the field reliability checks. Percentage agreement refers to comparison between observers on the frequencies with which variables were recorded during the observation period.

Table 1 is arranged to acknowlege the effect of the pressures of recording frequent events on the ability of observers to agree. In the left-hand half of the table, the variables recorded least frequently are shown; in the right-hand half of the table, the variables most frequently recorded are shown. As can be seen, the percentage agreement between paired observers is substantially higher for the least frequently observed processes.

Table 1

PERCENTAGE AGREEMENT BETWEEN PAIRED OBSERVERS IN RECORDING CLASSROOM OBSERVATION VARIABLES*

Percentage Agreement	Variables Least Frequently Recorded		Variables Most Frequently Recorded		Total Number of Variables
	Numbers	Total	Numbers	Total	
91-100	5, 7,12,25,38, 43,49,52,56,59, 60,63,64	13	2	1	14
81-90	4,21,23,35,41, 44,45,57,61,62	10	1, 3, 6, 8, 9, 11,13,29,40, 47	10	10
71-80		--	14,22,30,32,34, 39	6	6
61-70	20,48,50,54,58	5	10,15,27,31,36, 37,33/34/54,51, 65	9	14
51-60		--	16,16/18,19,26, 33,46	6	6
41-50		--	24,28,68	3	3
Number of variables		28		35	63
Mean percentage agreement		86.8%		69.0%	76.9%
Standard deviation		12.1		13.4	15.6

* Based on eight pairings (one in each of eight different projects) for reliability checks by an observer-trainer of an on-site observer.

ANALYSIS

From the abundance of information contained in the COI master tapes, a list of variables was selected for analysis, on the basis of the assigned tasks of delineating differences between FT and non-FT and discriminating between various classroom processes unique to different FT sponsor educational goals and philosophies. The 68 variables used in the observation analysis were developed during the construction of the observation system, to identify specific components of the different models. Although all variables would be expected to occur within all classrooms, the higher frequency of occurrence of certain variables within certain models could be hypothesized.

Mean Frequency of Variable Occurrence--Sponsors

From the master tapes containing all COI information, a data tape was generated containing all occurrences of the 68 variables throughout the FT and non-FT groups. The analysis program developed frequency rates of variable occurrence for each classroom by first dividing the total observed occurrences in a day by the appropriate unit of observation (i.e. classroom observation procedure or frame). These classroom frequencies were then grouped by sponsor and arrayed in histograms with accompanying classroom means and standard deviations for each sponsor and for FT and non-FT. The information is summarized and displayed in Table 2.

The method selected to test for sponsor differences (i.e., for planned variation in FT) was the analysis of variance. This was done although inspection of the distributions of classroom scores within sponsor revealed that, on many of the variables, the assumptions of normality and to a lesser extent homogeneity of variance appropriate to the F test were violated. For most sponsors on most variables, the resulting distribution was J shaped with the mode at zero. (This appeared to be especially true of behavior variables that a given sponsor was likely to suppress in implementing his model--such as independent activities in one of the heavily structured reinforcement models.) It has been shown (Norton 1952, summarized in Lindquist 1953), however, that non-normality of distribution does not affect the F test extensively that and in fact the J distribution yields results remarkably similar to the ideal normal.

Table 2

MEANS AND STANDARD DEVIATIONS OF FOLLOW THROUGH PROGRAM SPONSORS AND NON-FOLLOW THROUGH PROGRAMS ON CLASSROOM OBSERVATION VARIABLES

Variable \ Sponsor	Far West Lab (FW)		U. Arizona (UA)		Bank Street (BC)		U. Oregon (UO)		U. Kansas (UK)		High/Scope (HS)		U. Florida (UF)		Educational Development Center (ED)		New York U. (NY)		F Ratio Between Sponsors			Total		F Ratio FT/NFT			
	X	S.D.	X	S.D.	X	S.D.	X	S.D.	X	S.D.	X	S.D.	X	S.D.	X	S.D.	X	S.D.	df 8/88	Signif p<-		FT X	NFT X	df 1/121	Signif p<-		
Activities -(ACL)																											
1. A-Lunch, snack	.17	.12	.05	.03	.16	.07	.02	.02	.09	.08	.12	.08	.12	.06	.09	.12	.13	.04	5.47	.001		.11	.05	10.01	.01		UO, UA, ED, UK, HS, UF, NY, BC, FW
2. B-Group time, story, singing, dancing	.40	.16	.35	.17	.33	.20	.05	.05	.20	.09	.33	.14	.28	.13	.43	.17	.22	.10	8.06	.001		.29	.27	.17	NS		UO, UK, NY, UF, BC, HS, UA, FW, ED
3. C-Arithmetic, numbers, math., reading, alphabet, language development	.47	.16	.67	.10	.42	.15	.91	.07	.68	.10	.45	.23	.38	.19	.31	.20	.54	.14	15.41	.001		.55	.53	.11	NS		ED, UF, BC, HS, FW, NY, UA, UK, UO
4. D-Social studies, geography, science, natural world	.16	.13	.13	.13	.11	.07	.03	.04	.06	.05	.21	.11	05	.08	33	.30	.09	.07	5.43	.001		.12	.12	.02	NS		UO, UF, UK, NY, BC, UA, FW, HS, ED
5. E-Games, puzzles	.37	.24	.10	.08	.13	.12	.03	.07	.09	.07	.11	10	.09	.09	.31	.16	.23	.11	9.01	.001		.15	.07	5.60	.05		UO, UF, UK, UA, HS, BC, NY, ED, FW
6. F-Arts, crafts, sewing, cooking, pounding, sawing	.32	.18	.34	.22	.23	.12	.16	.19	.11	.07	.17	.17	.09	.10	.49	.19	.14	.14	6.27	.001		.22	.14	4.44	.05		UF, UK, NY, UO, HS, BC, FW, UA, ED
7. G-Blocks, trucks, dolls, dress-up	.09	.10	.08	.07	.11	.08	.00	.00	.05	.06	.05	.07	.02	.04	.24	.18	.04	.07	6.13	001		.07	.03	4.34	.05		UO, UF, NY, UK, HS, UA, FW, BC, ED
8. Adult with small groups in academic activities	.33	.21	.78	.30	.34	.21	1.70	.53	1.40	.49	.77	.73	.17	.26	.14	.17	.53	.16	18.78	.001		.71	.13	20.61	.001		ED, UF, FW, BC, NY, HS, UA, UK, UO
9. Academic activities	1.98	.96	2.18	.30	1.20	85	2.42	.36	2.31	.44	1.08	.82	.70	.49	.58	.54	2.09	1.01	10.71	.001		1.63	1.05	8.56	.01		ED, UF, HS, BC, FW, NY, UA, UK, UO
10. Independent child activities	4.22	1.22	2.43	.80	2.31	1.09	.88	.33	1.19	.47	.88	.75	.42	.62	4.06	1.91	2.53	.86	22.96	.001		1.99	1.29	4.55	.05		UF, UO, HS, UK, BC, UA, NY, ED, FW
11. Wide variety of activities	2.97	1.36	2.33	.48	1.91	.34	1.74	.33	1.93	.35	1.92	.37	1.17	.33	3.17	.93	1.74	.40	9.48	.001		2.06	1.38	16.13	.001		UF, UO, NY, BC, HS, UK, UA, FW, ED
12. Adult with one or two children in all activities	.17	.25	.04	.06	.16	.11	.03	.03	.08	.10	.03	.04	.03	.05	.17	.13	.03	.05	3.29	.01		.08	.04	2.46	NS		HS, NY, UO, UF, UA, UK, BC, FW, ED
13. Aide participating in academic activities	.30	.22	.41	.16	.27	.15	.87	.18	1.09	.29	.28	.20	.29	.23	1.09	.08	.25	.05	28.57	.001		.45	.08	25.08	.001		ED, NY, BC, HS, UF, FW, UA, UO, UK
Interactions (FMO)																											
14. Adult informing child symbolically	1.99	.97	.92	.61	2.06	1.57	1.18	1.43	.91	4.18	1.96	2.73	2.01	1.15	7.39	6.26	.11	.14	7.26	.001		2.36	1.79	.89	NS		NY, UA, UO, HS, FW, UF, BC, UK, ED
15. Adult asking child a direct question	.70	.85	3.46	1.96	1.32	.69	7.30	2.06	1.76	2.49	2.66	.55	1.08	1.09	2.12	1.09	2.85	1.09	19.65	.001		2.60	2.95	.30	NS		FW, UF, BC, UK, ED, HS, NY, UA, UO
16. Direct question followed by child response	.59	.74	2.82	1.56	1.06	.59	5.99	2.04		2.13	2.33	.51	.97	1.04	1.88	.96	2.60	1.00	16.68	.001		2.19	2.34	.13	NS		FW, UF, BC, UK, ED, HS, NY, UA, UO
17. Adult praise and corrective feedback	3.83	1.74	3.80	.63	4.92	1.75	6.98	2.80	5.87	1.25	5.26	1.14	3.18	1.24	7.37	2.40	4.63	1.53	14.71	.001		4.67	4.69	.04	NS		UF, ED, UA, FW, NY, BC, HS, UK, UO
18. Child response followed by adult feedback	.52	.53	.44	.17	.68	.26	.95	.79	.22	.17	.86	.40	.72	.31	.15	32	.64	.20	4.31	.001		.60	.73	1.33	NS		ED, UK, UA, FW, NY, BC, UF, HS, UO
19. Adult informing child	.65	.58	2.74	1.40	2.59	.85	5.02	1.48	2.08	1.09	1.95	1.29	4.07	1.92	2.29	1.58	1.26	.61	13.45	.001		4.84	5.86	13.91	.001		FW, NY, HS, ED, BC, UA, UF, UK, UO
20. Adult asking child thought provoking questions	.83	.47	1.58	.88	1.21	1.01	.08	.10	.92	1.40	1.63	1.32	1.36	1.87	.29	.55	.08	.07	3.12	.01		1.00	.66	1.86	NS		UO, NY, ED, FW, UK, BC, UF, UA, HS

Means for COP variables = frequency of occurrence/NCOP
Means for FMO variables = frequency of occurrence X 60/NFRM

* Sponsor performance on each variable ranked in order of increasing magnitude of means (--->). Underlining indicates subsets of no significant difference between sponsors as determined by multiple range test Newman-Keuls Method.

Table 2 (continued)

Variable	Far West Lab (FW) X̄	S.D.	U. Arizona (UA) X̄	S.D.	Bank Street (BC) X̄	S.D.	U. Oregon (UO) X̄	S.D.	U. Kansas (UK) X̄	S.D.	High/Scope (HS) X̄	S.D.	U. Florida (UF) X̄	S.D.	Educational Development Center (ED) X̄	S.D.	New York U. (NY) X̄	S.D.	F Ratio Between Sponsors df 8/88	Signif p<=	Total FT X̄	NFT X̄	F Ratio FT/NFT df 1/121	Signif p<=	P<= .05	X̄ = NFT
21. Adult informing child with concrete objects	.72	.73	.12	.32	.28	.32	.006	.01	1.04	1.98	.76	1.12	.52	.73	.24	.35	.06	.09	1.22	NS	.47	.26	1.28	NS	UO, NY, ED, BC, UA, UF, FW, HS, UK	
22. Adult acknowledgement	1.33	.47	1.45	.42	1.68	.96	1.45	1.25	.84	.65	1.86	.65	1.35	.84	.47	.69	1.79	.96	2.67	.05	1.40	1.58	.80	NS	ED, UK, FW, UF, UA, UO, BC, NY, HS	
23. Child informing self with objects	.14	.72	.18	.37	.17	.30	.01	.02	.25	.39	.33	.45	.12	.41	.18	.37	.13	.28	1.64	NS	.25	.27	.05	NS	UK, FW, BC, UF, UA, ED, HS, NY, UO	
24. All child self-learning	1.89	1.82	1.61	1.30	2.05	1.80	5.10	6.59	3.95	4.38	3.19	4.57	1.32	2.27	2.47	3.27	1.33	1.34	8.39	.001	2.56	2.16	3.55	.10	NY, UF, UA, FW, BC, ED, HS, UK, UO	
25. Child informing another child	.13	.16	.22	.11	.05	.07	.00	.00	.03	.01	.14	.22	.01	.02	.00	.00	.01	.02	5.49	.001	.08	03	2.31	NS	ED, UO, UF, NY, UK, BC, FW, HS, UA	
26. Child informing self symbolically	1.27	.95	.63	.56	1.55	1.18	2.41	3.14	3.61	3.90	2.16	3.45	.82	1.30	1.62	2.18	.42	.81	2.05	.10	1.63	1.00	1.49	NS	NY, UA, UF, FW, BC, ED, HS, UO, UK	
27. Child questioning adult	.38	.59	1.11	.69	.20	.20	.11	.15	.10	.10	.48	.41	.11	.11	.20	.30	.32	.26	8.29	.001	.38	.33	.26	NS	UK, UF, UO, BC, ED, NY, HS, FW, UA	
28. Child self-expression	17.86	3.94	15.17	3.70	11.57	3.89	5.55	2.73	8.05	3.70	10.74	10.89	11.40	6.73	9.38	5.87	20.21	2.88	6.57	.001	12.07	10.59	.98	NS	UO, UK, ED, HS, UF, BC, UA, FW, NY	
29. Adult communication focus - one or two children	10.70	2.64	12.38	2.63	13.28	3.60	11.77	3.80	13.73	3.60	11.05	2.59	10.04	4.19	6.38	4.97	7.11	1.55	4.50	.001	11.22	10.42	.78	NS	ED, NY, UF, FW, HS, UO, UA, BC, UK	
30. Adult communication focus - small group	2.59	.82	3.19	1.64	2.65	1.38	15.96	4.37	6.18	4.00	5.65	3.88	4.29	2.89	7.09	6.88	3.37	2.29	18.22	.001	5.52	1.59	15.21	.001	FW, BC, UA, NY, UF, HS, UK, ED, UO	
31. Adult communication focus - large group	5.54	3.45	5.23	2.35	7.25	2.97	2.31	2.68	4.70	3.94	4.14	1.50	11.65	6.36	9.18	3.26	4.36	1.36	7.05	.001	6.02	12.41	45.65	.001	UO, HS, NY, UK, UA, FW, BC, ED, UF	
32. Adult praise/acknowledgement of child	1.95	.65	1.82	.41	2.56	1.20	4.65	1.79	4.18	.96	3.14	1.04	2.01	.96	1.67	.91	2.74	1.13	9.07	.001	2.76	2.48	.21	NS	ED, UA, FW, UF, BC, NY, HS, UK, UO	
33. Adult positive corrective feedback	1.50	1.20	1.16	1.02	1.21	.70	1.36	1.43	1.40	.84	.68	.63	.10	.18	.51	.35	.94	.14	3.34	.01	1.03	1.12	.18	NS	UF, ED, HS, NY, UA, BC, UK, UO, FW	
34. Adult negative corrective feedback	.30	.35	.44	.35	.93	.41	.10	.11	.24	.26	.44	.41	.04	.04	.19	.34	.31	.08	8.56	.001	.35	.39	.12	NS	UF, UO, ED, UK, FW, NY, HS, UA, BC	
35. Adult negative affect	.10	.17	.13	.09	.26	.24	.03	.05	.18	.20	.24	.17	.36	.43	.14	.25	.12	.05	2.39	.05	.18	.21	.39	NS	UO, FW, NY, UA, ED, UK, HS, BC, UF	
36. Child negative affect	.88	.74	.61	.37	.41	.27	.01	.01	.89	1.06	.92	68	.25	.28	.13	.22	.78	.31	4.72	.001	.55	.40	1.29	NS	UO, ED, UF, BC, UA, NY, FW, UK, HS	
37. All negative affect	2.10	1.77	1.60	.86	1.31	.76	.04	.07	2.08	2.43	2.62	1.44	1.04	1.03	.50	.86	1.76	.66	4.09	.001	1.50	1.23	.58	NS	UO, ED, UF, BC, UA, NY, UK, FW, HS	
38. Adult to child positive affect	.39	.32	.17	.16	.06	.08	.09	.11	.16	.31	.29	.31	.18	.34	.10	.17	.04	.07	2.35	.05	.18	.09	2.42	NS	NY, BC, UO, ED, UK, UA, UF, HS, FW	
39. Child to adult positive affect	.59	.33	.28	.14	.16	.23	.04	.08	.25	.43	.77	.84	.04	.06	.07	.07	.05	.07	5.65	.001	.27	.29	.02	NS	UO, UF, NY, ED, BC, UK, UA, FW, HS	
40. All positive affect	3.55	2.95	2.61	1.68	.63	.63	1.45	2.00	1.44	1.86	3.24	1.96	1.46	1.75	.40	.45	.43	.19	4.42	.001	1.86	1.49	.73	NS	ED, NY, BC, UK, UO, UF, UA, HS, FW	
41. Child positive affect	.25	.39	.12	.14	.00	.00	.00	.00	.04	.09	.04	.03	.00	.00	.00	.00	.04	.05	3.52	.01	.06	.03	.69	NS	ED, UF, UO, BC, HS, NY, UK, UA, FW	
42. Adult/child ratio	.12	.02	.11	.03	.17	.06	.13	.05	.20	.06	.15	.07	.16	.04	.13	.04	.12	.03	12.31	XXX	.15	.08	32.99	.001	UA, FW, NY, ED, UO, HS, UF, BC, UK	
43. Active play	16	.11	.09	.12	.12	.10	.00	.01	.04	.04	.05	.04	.08	.13	.14	.17	.01	.02	3.53	.001	.08	.04	3.56	.10	UO, NY, UK, HS, UF, UA, BC, ED, FW	
44. Adult with one or two children in academic activities	.37	.29	.08	.08	.23	.12	.06	.05	.37	.34	.10	14	.11	.20	.14	.12	.10	.07	4.58	.001	.19	.06	6.93	.01	UO, UA, NY, HS, UF, ED, BC, FW, UK	
45. Adults with large group in academic activities	.08	.08	.04	.04	.10	.11	.16	.15	.12	.11	.06	.10	32	.23	.04	.01	.09	.05	5.76	.001	.12	.38	17.88	.001	ED, UA, HS, FW, NY, BC, UK, UO, UF	
46. Child response - adult acknowledgement	.53	.22	.51	.27	1.08	.73	1.19	1.04	.51	.46	1.13	.43	1.01	.60	.28	.49	1.58	.92	4.26	.001	.86	1.05	1.29	NS	ED, UA, UK, FW, UF, BC, HS, UO, NY	

Table 2 (concluded)

	Sponsor	Far West Lab (FW)		U. Arizona (UA)		Bank Street (BC)		U. Oregon (UO)		U. Kansas (UK)		High/Scope (HS)		U. Florida (UF)		Educational Development Center (ED)		New York U. (NY)		F Ratio Between Sponsors			Total		F Ratio FT/NFT			
	Variable	X̄	S.D.	X̄	S.D.	X̄	S.D.	X̄	S.D.	X̄	S.D.	X̄	S.D.	X̄	S.D.	X̄	S.D.	X̄	S.D.	df 8/88	Signif p<--		FT X̄	NFT X̄	df 1/121	Signif p<	p<.05	NFT
47.	Child response → adult praise	.18	.20	.12	.12	.42	.19	2.32	1.35	1.88	1.30	.95	.51	.55	.43	1.21	.99	.38	.13	12.84	.001		.85	.73	.30	NS	UA, FW, NY, BC, UF, HS, ED, UK, UO	
48.	Adult question → child response → adult corrective feedback	.08	.12	.19	.13	.09	.08	.34	.17	.04	.04	.32	.11	.09	.10	.06	.11	.26	.14	10.64	.001		.16	.18	.27	NS	UK, ED, FW, BC, UF, UA, NY, HS, UO	
49.	Adult question → child response → adult praise	.02	.05	.05	.05	.04	.05	.97	.53	.66	.95	.29	.16	.05	.06	.39	.31	.13	.08	8.56	.001		.27	.25	.06	NS	FW, BC, UA, UF, NY, HS, ED, UK, UO	
50.	Adult question → child response → adult acknowledgement	.09	.12	.22	.16	.15	.15	.56	.33	.09	.16	.50	26	.13	.15	.12	.19	.98	.65	11.90	.001		.28	.38	1.16	NS	UK, FW, ED, UF, BC, UA, HS, UO, NY	
51.	Adult thought-provoking question → child response	.70	.38	1.31	.75	1.10	1.03	.06	.08	.87	1.39	1.43	1.14	1.13	1.57	.27	.52	.08	.06	2.82	.01		.87	.53	2.28	NS	UO, NY, ED, FW, UK, BC, UF, UA, HS	
52.	Thought provoking question → child response → child elaboration	.12	.11	.10	.07	.16	.28	.00	.00	.23	.43	.09	.10	.01	.03	.00	.00	.00	.00	2.06	.05		.09	.01	4.29	.05	NY, ED, UO, UF, HS, UA, FW, BC, UK	
53.	All feedback	3.82	2.47	3.57	2.20	4.91	2.80	7.23	4.89	5.87	2.95	5.47	3.03	3.39	2.11	2.67	2.33	3.61	1.39	53.07	.001		4.61	4.73	2.17	NS	ED, UF, UA, NY, FW, BC, HS, UK, UO	
54.	Adult neutral corrective feedback	.01	.02	.09	.14	.05	.06	.77	.75	.01	.02	.85	.48	.99	.44	.03	.04	.00	.00	16.54	.001		.34	.40	.30	NS	NY, UK, FW, ED, BC, UA, UO, HS, UF	
55.	Child self-learning	.18	.15	.53	.37	.33	.32	2.68	3.43	.09	.09	.70	67	.38	.56	.67	.72	.78	.25	4.70	.001		.68	1.19	2.01	NS	UK, FW, BC, UF, UA, ED, HS, NY, UO	
56.	Adult positive affect	.58	.64	.22	.20	.09	.15	.13	.11	.17	.31	.34	.33	.18	.34	.12	.22	.08	.11	2.71	.05		.23	.19	3.11	.10	NY, BC, ED, UO, UK, UF, UA, HS, FW	
57.	Adult to child negative affect	.09	.14	.11	.08	.23	.21	.03	.05	.16	.18	.22	.17	.35	.42	.14	.23	.12	.04	2.28	.05		.16	.19	.33	NS	UO, FW, UA, NY, ED, UK, HS, BC, UF	
58.	Child to adult negative affect	.24	.23	.26	.13	.23	.16	.003	.01	.09	.13	.53	.41	.18	21	.10	.17	.08	.08	6.21	.001		.21	.23	.07	NS	UO, NY, UK, ED, UF, BC, FW, UA, HS	
59.	Adult to child positive touch	.11	.22	.03	.03	.01	.01	.03	.07	.003	.01	.02	.02	.00	.00	.02	.05	.02	.04	1.79	NS		.02	.001	2.10	NS	UF, UK, BC, HS, ED, NY, UO, UA, FW	
60.	Adult to child negative touch	.03	.04	.01	.02	.03	.03	.01	.02	.02	.03	.02	.03	.02	.02	.01	.02	.02	.02	.81	NS		.02	.02	.03	NS	UA, UO, ED, UF, HS, UK, NY, BC, FW	
61.	Child to child positive touch	.17	.23	.09	.12	.003	.01	.00	.00	.01	.03	.04	.03	.00	.00	.00	.00	.04	.05	4.81	.001		.04	.03	.67	NS	ED, UF, UO, BC, UK, HS, NY, UA, FW	
62.	Child to child negative touch	.15	.14	.08	.13	.08	.09	.00	.00	.37	.51	.08	.11	.02	.03	.00	.00	.09	.09	3.67	.01		.10	.04	1.85	NS	ED, UO, UF, UA, HS, BC, NY, FW, UK	
63.	Child to adult positive touch	.09	.20	.01	.02	.00	.00	.00	.00	.01	.02	.00	.00	.00	.00	.00	.00	.00	.00	1.85	.10		.01	.00	.65	NS	NY, ED, UF, HS, UO, BC, UK, UA, FW	
64.	Child to adult negative touch	.002	.01	.00	.00	.002	.01	.00	.00	.02	.03	.003	.01	.00	.00	.00	.00	.00	.00	2.06	.05		.003	.000	1.19	NS	NY, ED, UF, UO, UA, BC, FW, HS, UK	
65.	Child working with materials	12.02	5.73	8.82	1.93	8.34	3.75	8.47	5.84	11.52	6.95	8.33	3.76	10.91	6.59	9.51	8.60	13.40	2.55	1.21	NS		9.94	9.72	.04	NS	HS, BC, UO, UA, ED, UF, UK, FW, NY	
66.	Use of symbols	11.13	5.89	8.29	4.63	9.63	5.60	4.59	4.59	18.07	4.99	8.28	9.58	7.45	4.32	15.53	3.75	6.79	4.26	5.56	.001		9.76	9.85	.00	NS	UO, NY, UF, HS, UA, BC, FW, ED, UK	
67.	Use of concrete objects	8.81	2.83	8.44	4.15	4.85	2.72	.30	.24	8.51	4.64	3.27	3.45	1.41	1.35	3.80	5.61	9.95	3.38	12.07	.001		5.35	3.75	2.50	NS	UO, UF, HS, ED, BC, UA, UK, FW, NY	
68.	Movement	2.55	1.21	2.95	2.42	2.99	1.30	.77	.57	2.32	2.26	4.10	2.38	1.06	1.15	1.57	2.66	2.59	.50	3.87	.001		2.39	2.42	.09	NS	UO, UF, ED, UK, FW, NY, UA, BC, HS	

The same study reported that, even in cases where both normality and homogeneity assumptions were violated, the alpha error level was increased only slightly. In the present study, obtained probabilities of .05 may actually be as high as .08, and obtained values of $< .01$ may be as high as .03. Because the variables selected for comparison in this study were so sensitive to process variation, most of the sponsor differences yielded chance probability values $< .001$. Thus, while for some variables the alpha error level may vary slightly higher than reported, differences reported as significant are almost certainly true differences. The F-test results are displayed in Table 2.

In comparing treatment (i.e., sponsor process) means on a given performance measure by using the analysis of variance, it should be remembered that a significant F test indicates only that a difference exists. Unless there are only two treatments, the F test yields little information regarding the nature of the difference. In the present case, a highly significant F states only that the nine sponsor processes are not the same on the performance measure examined. It does not indicate that each process differs from each other process, or that only one process differs from all the others, or that half of them are essentially the same and differ from the other half which are also essentially alike. To answer such questions, other, a posteriori tests have been developed. One of the most useful in probing the nature of differences in treatment means following a significant overall F is the q static used in a range test. The particular method used with these data is known as the Newman/Keuls procedure (described by Winer 1962). In brief, this technique uses a matrix of differences between treatment means to enable a q test of the differences between all pairs of means. There are several alternative procedures. The Newman/Keuls procedure seems to offer a good balance between power and conservatism; it keeps the level of significance equal to alpha for all ordered pairs of treatment comparisons, however many rank steps apart they may be; and by using an harmonic mean, n can be used in comparing the unequal sample sizes contained in the present study. The resulting subsets of no significant difference between sponsors are displayed in Table 2.

Alternative educational strategies reflected in program activities and interactions.—The primary questions in this section are: How do sponsored classrooms differ from one another? Do observed differences among models correspond to predictions based on sponsors statements?

Each sponsor's educational model implies what activities and interactions should occur in a classroom. Through statements made by the sponsors about their models and knowledge of theories underlying parts of the models, the COI variables were developed. Actual data collected in sponsored classrooms were then used to determine whether, on variables expected to reveal a sponsor's program, relatively high frequences did, in fact, occur in the classroom.

Strategies grouped--sponsor similarities.—Many contemporary educators have adopted versions of B. F. Skinner's (1968) reinforcement theory applied to classroom learning. Educators who adhere to Skinner's views stress that immediate reinforcement of a correct response made by the learner is crucial in establishing new learning. It is assumed that all children learn in basically the same fashion and that differences in behavior are largely the result of differences in previous learning experiences and reinforcement histories. Therefore, to achieve a specified educational objective, it is important to design an instructional sequence in small steps, each of which is reinforced and all of which cumulate to produce the final criterion behavior.

The theoretical basis of the UO and UK models draws heavily from reinforcement theory. Objectives are specified in advance; teachers provide information that the child is expected to learn. This is followed by a question to which the child can reasonably respond. The teacher gives immediate feedback in the form of praise for a correct response or correction for a wrong one. Repetition is used to ensure retention.

Because the UO and UK models incorporate some of the views of Skinner, and also because they prescribe small group instruction to facilitate immediate reinforcement and emphasize the standardized test as the criterion measure, one could predict they would score high on the following variables:

Recorded on the Classroom Checklist
- Academic activities (Variable 9)
- Adult with small groups in academic activities (8)
- Aide participating in academic activities (13)

Recorded on the Five-Minute Interaction
- Adult informing child symbolically (14)
- Adult asking child a direct question (15)
- Direct question followed by child response (16)
- All feedback (53).

Table 3 shows that the UK and UO classrooms score on the extreme high end of the dimension on those variables, as would be expected.

For another example of how knowledge of the theories underlying the model permits a prediction of classroom activities and interactions, results for the sponsors who to some extent identify with the theories of Piaget and Bruner can be examined.

For both Piaget and Bruner, learning in young children begins with motor responses made by the child to objects in his environment. Later learning of a more complex nature is based on these direct experiences. It therefore appears to be important for educators to provide opportunities for active manipulation of materials by children. The manipulation of objects is a prerequisite for the verbal understanding required for more complex thought. Learning is thought to be best facilitated through concrete experiences which can readily be assimilated into the existing cognitive structure.

These interactive learning theories also suggest that large group instruction is all but impossible for successful teaching of young children. To develop an adequate concept of social reality and to learn to understand another person's point of view, children must talk to one another, even argue. In models based on interactive theory, a wide emotional range for both adults and children could be expected. The give and take is seen as essential to developing social understanding at the verbal level. Educational programs based on such cognitive theories of learning are primarily suggestive, since all learning must be adapted to make it appropriate for the individual learner.

FW, UA, BC, HS, ED, and NY share some of the view of Piaget and Bruner, and would be expected to be high on the following variables:

Recorded on the Classroom Checklist
- Independent child activities (Variable 10)
- Wide variety of activities (11)
- Adult communication focus--one or two children (29)

Recorded on the Five-Minute Interaction
- Adult asking thought provoking questions (20)
- Adult informing child with concrete objects (21)
- Child informing self with objects (23)
- All child self-learning (24)
- Child self-expression (28).

Table 3

OBSERVED DIFFERENCES AMONG SPONSORS ON COMPONENT VARIABLES

Variable	Low Sponsor Performance* High
1. A-Lunch, snack	UO, UA, ED, UK, HS, UF, NY, BC, FW
2. B-Group time, story, singing, dancing	UO, UK, NY, UF, BC, HS, UA, FW, ED
3. C-Arithmetic, numbers, mathematics, reading, alphabet, language development	ED, UF, BC, HS, FW, NY, UA, UK, UO
4. D-Social studies, geography, science, natural world	UO, UF, UK, NY, BC, UA, FW, HS, ED
5. E-Games, puzzles	UO, UF, UK, UA, HS, BC, NY, ED, FW
6. F-Arts, crafts, sewing, cooking, pounding, sawing	UF, UK, NY, UO, HS, BC, FW, UA, ED
7. G-Blocks, trucks, dolls, dress-up	UO, UF, NY, UK, HS, UA, FW, BC, ED
8. Adults with small groups in academic activities	ED, UF, FW, BC, NY, HS, UA, UK, UO
9. Academic activities	ED, UF, HS, BC, FW, NY, UA, UK, UO
10. Independent child activities	UF, UO, HS, UK, BC, UA, NY, ED, FW
11. Wide variety of activities	UF, UO, NY, BC, HS, UK, UA, FW, ED
12. Adults with one or two children in all activities	HS, NY, UO, UF, UA, UK, BC, FW, ED
13. Aide participating in academic activities	ED, NY, BC, HS, UF, FW, UA, UO, UK
14. Adults informing child symbolically	NY, UA, UO, HS, FW, UF, BC, UK, ED
21. Adults informing child with concrete objects	UO, NY, ED, BC, UA, UF, FW, HS, UK
22. Adult acknowledgement	ED, UK, FW, UF, UA, UO, BC, NY, HS
23. Child informing self with objects	UK, FW, BC, UF, UA, ED, HS, NY, UO
25. Child informing another child	ED, UO, UF, NY, UK, BC, FW, HS, UA

Table 3 (Concluded)

Variable	Low Sponsor Performance* High
26. Child informing self symbolically	NY, UA, UF, FW, BC, ED, HS, UO, UK
27. Child questioning adult	UK, UF, UO, BC, ED, NY, HS, FW, UA
28. Child self-expression	UO, UK, ED, HS, UF, BC, UA, FW, NY
29. Adult communication focus--one or two children	ED, NY, UF, FW, HS, UO, UA, BC, UK
30. Adult communication focus--small groups	FW, BC, UA, NY, UF, HS, UK, ED, UO
31. Adult communication focus--large groups	UO, HS, NY, UK, UA, FW, BC, ED, UF
32. Adult praise/acknowledgement	ED, UA, FW, UF, BC, NY, HS, UK, UO
42. Adult/child ratio	UA, FW, NY, ED, UO, HS, UF, BC, UK
43. Active play	UO, NY, UK, HS, UF, UA, BC, ED, FW
44. Adult with one or two children in academic activities	UO, UA, NY, HS, UF, ED, BC, FW, UK
45. Adult with large group in academic activities	ED, UA, HS, FW, NY, BC, UK, UO, UF
49. Adult question→child response→adult praise	FW, BC, UA, UF, NY, HS, ED, UK, UO
50. Adult question→child response→adult acknowledgement	FW, UK, ED, UF, BC, UA, HS, UO, NY
51. Adult thought-provoking question→child response	UO, NY, ED, FW, UK, BC, UF, UA, HS
52. Thought-provoking question→child response→child elaboration	NY, ED, UO, UF, HS, UA, FW, BC, UK
53. All feedback	ED, UF, UA, NY, FW, BC, HS, UK, UO
55. Child self-learning	UK, FW, BC, UF, UA, ED, HS, NY, UO

* Sponsor performance on each variable in order of increasing magnitude of means. Underlining indicates subset of no significant difference between sponsors, as determined by multiple range test, Newman Kuels method (see Section V). $p = < .05$.

Table 3 shows that on most of the above variables these six sponsors do cluster near the high-frequency end of the dimension.

The UF, which focuses strongly upon parents as the instrument of change in children's behavior, does not fit into either of these two main groups. It is possible, however, to think of quite a number of ways of grouping sponsors to predict commonalities of performance. Many definitions of a dimension called "structure" might be employed to discover whether there are some variables on which structured programs can be clearly distinguished from less structured programs.

Results: Strategies differentiated--sponsor differences.— Table 3 displays results on the 35 variables considered most relevant to sponsor's educational philosophies and strategies. On each variable the sponsors are ranked from left to right in order of increasing magnitude of means. The underlining indicates sponsors that do not differ significantly from each other. Breaks in the underlining indicate significant differences.

As noted, the UO and UK were significantly higher than other sponsors on Variable 8, "adult with small groups in academic activities" and Variable 13, "aide participating in academic activities." The UO was higher than all other sponsors on Variable 9, "academic activities"; UK next, but significantly lower. This difference reflects these sponsors accurately. The UK method requires that academic activities alternate with periods of self-selected activities; therefore, the academic activities do not occur as frequently for the UK as for the UO. The UO has academic activities occurring continually, with four groups of children rotating among three adults who are teaching reading, language development, and computation; the fourth group works independently until it is again their turn to work with an adult.

At the UO, adults more often direct communication to small groups (Variable 30). The adults often start the group chanting specific information to be learned, and the entire group is praised by such statements as "You're smart today," or "You're really smart." Although the UK model includes teachers working with small groups, teachers address individual children (Variable 29) since children are rewarded individually for correct behavior.

ED and FW seem quite similar in their expectations of the way a classroom ought to look, although FW makes great efforts to change teacher behavior, and ED makes little effort to change the teacher unless the teacher requests assistance. Both sponsors have learning centers where

children can choose from a wide variety of actitities and function independently. There is adult guidance to ensure that basic skills will be learned. Adults are expected to interact with one or two children rather than with predetermined small groups. All activities, not just reading, writing, and computing, are considered learning activities. But the data show that while these sponsors do indeed rank higher than most others on the frequency of occurrence of activities other than those described as academic, and highest on Variable 11, wide variety of activities, FW's emphasis on environmental objects that are responsive and give children immediate feedback shows up on Variables 5 and 10, the only variables on which FW replaces ED as highest-ranked sponsor.

The children in FW classes are quite different from those in ED classes and similar to those in BS classes on Variable 52, child responding with elaboration to thought-provoking questions. The FW children rank higher than most children on Variable 28, self-expression, and place high, although not significantly, on Variable 25, child informing another child, and on Variable 27, child questioning adult.

In UA, HS, and NY projects, the children are more likely to be organized in predetermined small groups that rotate from one adult to another for instruction. The sponsors develop concepts through organized activities and games. One group may be working with matrix games, another may be learning to categorize by the sense of touch or smell, and a third may be learning about conservation of matter as they weigh balls of clay. At some point, the groups will rotate, so that all children can have the three learning experiences prepared for that day. Children are allowed to explore independently with materials during some part of the day.

The data show that UA, HS, and NY rank together on variables as adult with small group in academic activities. However, the fact that the NY model provides for extensive use of games shows up, since NY is in the top-ranked group on that variable and UA is significantly different from NY on the variety of activities observed (Variable 11).

It would be, of course, possible to continue noting differences among sponsors' methods and then comparing narratively every model with every other model on pertinent variables, but the point has been made that (1) sponsors show unique patterns in terms of the variables on which they differ from one another; (2) sponsors whose methods are consistent with well-known theoretical positions cluster together on the variables involved in the theory; and (3) sponsor differences on variables can usually be understood by direct reference to sponsor statements about components of models.

A final perspective on sponsor similarities and differences can be found in Table 4. Entries in this table represent the number of variables (out of the 68 listed on Table 3) on which one sponsor was significantly different from another. Examination of the column labeled UO reveals that the UO classrooms differ from the classrooms of other sponsors on more variables than those of any other sponsor.

The BC program and the UF program are alike on more variables than any other pair. This is to be expected, since both models are very similar, especially in specifications for organization and kinds of activities, to the "traditional" classroom model typically taught at schools of education and used by many teachers throughout the country.

Mean Frequency of Variable Occurrence--Follow Through and Non-Follow Through

Histograms of all FT and non-FT classrooms were obtained for each variable. For the reasons described above, the analysis of variance was chosen to test for differences. Not surprisingly, the effect of combining all the FT classes for comparison with all the non-FT classes was to reveal differences only on variables for which sponsor differences were slight and which commonly differed in a unidirectional manner from non-FT. For the most part, such variables tend to be those directly related to the differential amount of money available to FT and non-FT--i.e., variables that reflect the use and distribution of additional adults, foods and snacks, and equipment. Probably the most salient overall differences between the FT and non-FT groups is the adult/child ratio, which in turn is reflected in several variables related to the use of aides and the variety of activities that can reasonably be allowed and supervised.

It is an important part of our assignment to identify the specific variables in which all FT classes commonly differ from all non-FT classes, but it should not be assumed that there are no FT versus non-FT differences on other variables. Given a range of frequency scores on a behavioral or procedural variable, the non-FT mean score is very often similar to the overall mean of the various sponsor scores, but many of the latter individually occupy very significantly different positions at both extremes of the distribution. Thus, variables sensitive to sponsor difference (on which they have high variance) may be quite insensitive to FT versus non-FT differences when the FT sponsor scores are combined. The more sensible approach is to speak of differences between FT and non-FT in terms of which sponsor processes differ from non-FT. There are several methods to accomplish this. All non-FT could be included as a treatment in analysis of variance and in a follow-up range test, and its difference from

Table 4

NUMBER OF VARIABLES OUT OF 68
ON WHICH SPONSORED PROGRAMS DIFFER SIGNIFICANTLY

	FW	UA	BC	UO	UK	HS	UF	EDC	NYU
Far West Lab (FW)	--	17	17	35	25	22	19	16	17
U. of Arizona (UA)	17	--	13	29	22	15	19	19	6
Bank Street College (BC)	17	13	--	31	16	10	10	14	12
U. of Oregon (UO)	35	29	31	--	23	24	27	33	24
U. of Kansas (UK)	25	22	16	23	--	19	21	22	20
High/Scope (HS)	22	15	10	24	19	--	17	22	12
U. of Florida (UF)	22	19	10	27	21	17	--	17	11
Educ. Devel. Cen. (ED)	16	19	14	33	22	22	17	--	16
New York Univ. (NY)	17	6	12	24	20	12	11	16	--

each sponsor on each variable could be assessed. A problem here is the variation in sample size (number of classrooms) between non-FT (26) and certain sponsors (6). Another solution would be to compare each sponsor/site with its own non-FT comparison classrooms. The major problems here are the very great number of comparisons that would result (9 × 68), and the fact that not all sponsor/sites had comparison classrooms. The solution favored is a repeat analysis of variance in which, for each variable, all sponsor treatments are compared with a control (all non-FT) using the procedure of Dunnett (1955) for handling multiple comparisons by constructing a joint confidence interval for all comparisons. This method is preferable, because the mean scores of the combined non-FT classrooms probably best represent the behavior of the nation's typical classroom attended by predominantly disadvantaged children. For the present, we simply display in Table 2 the rank occupied by non-FT in the range of sponsor scores. Although non-FT was not included in the analysis upon which the range test was made, the reader can obtain a fairly reliable visual estimate of which sponsors differ from non-FT on each variable considered.

Results.—Among the differences found between the FT and non-FT classes on selected variables in spring 1971, the following six are considered particularly important:

1. Children in FT classes experienced a wider variety of activities than children in comparison classrooms. These activities included table games (e.g., puzzles, lotto, matrices), arts, crafts, sewing, cooking, carpentry, trucks blocks, and dolls.

2. FT children more often engaged "independently" in a variety of activities than non-FT children did.

3. There was a higher proportion of adults in the FT classrooms than in the comparison group, and these adults had the training necessary to work with children in small groups. As a result, there was more individual and small group instruction in the FT classrooms.

4. In the FT classrooms, thought-provoking questions asked by adults were more often responded to with elaboration by children. This means that when a child is asked "What do you think?" or "What do you feel?", the child not only responds but he responds in a relatively complete and

elaborate manner. This finding seems to have educational importance if one wishes to produce through our educational system children who can expatiate on ideas.

5. In the non-FT classrooms, the adults did more instructing of children in large groups than they did in the FT classrooms.

Relations of Process Variables to Outcome Measures

Exploratory analyses were undertaken to examine the general question of relationships between process variables derived from the COI and three measures of pupil outcome: achievement, attitudes toward school and learning (affect), and absence. Two complementary lines of investigation were followed. The two analyses tend to reinforce one another. Both, however, must be viewed as preliminary and exploratory at this time.

Correlation and multiple regression analyses.—Multiple regression analyses using a large set of predictor variables (approximately 30) were described in the main report on this project. There, one category of predictor variables was referred to as "treatment" variables and included such measures as months of FT, number of classroom aides, percentage of children receiving FT services, and parent-school involvement. Those analyses suggested that the treatment variables as a class, while not explaining a large proportion of the variance in dependent variable measures, were as potent or more so than other categories of predictors, except for those referred to as child aptitude measures. Those analyses suggested, therefore, that an important portion of the variance in dependent variable measures could be accounted for by characteristics of the school or classroom treatment experienced by the child. The variables used in the integrated multiple regression analyses of the mainreport were relatively gross and did not include any variables from the Classroom Observation Instrument.

The analyses described below examined a selected set of classroom process variables as predictors of pupil outcome measures independent of other predictor variables; that is, only variables derived from the COI were used. These results should be viewed as suggesting the relative potency of particular process variables. The regression analyses using process variables as predictors should not be interpreted as tests of the ability to predict outcome measures, for they have not included other variables of demonstrated power.

The results of analysis of these process variables are presented in two ways. First, the zero-order correlation between each of these variables and the three outcome measures (achievement, school-oriented affect, and attendance) are shown in Table 5.

The principal source of data for child outcome measures was the FT test battery (see Table 6). This battery assesses performance in cognitive and noncognitive or affective domains. The initial step consists of sorting items into these two major categories. Aggregating responses to items within each of these categories yields two principal dependent variables: "achievement" and "attitude."

The "attitudes" measure primarily consists of scaled responses to each of a series of items regarding the child's feelings toward himself others, school, and learning in general. The response scale varies from 1 for negative affect to 3 for positive affect. The assumption that attitude is a unitary dimension allows direct summation of item responses into a single scale score.

The relative frequency of absenteeism, as obtained from the pupil roster, was defined as an unobtrusive outcome measure. Alternatively, the value of absenteeism as a dependent variable would have to be derived in conjunction with other outcomes as affect or achievement.

Correlational analysis.—Table 5, shows the zero-order correlations between each of 11 process variables and three outcome measures for kindergarten, first grade, and second grade classrooms, separately and combined, in which both observations and other data were available. The table demonstrates that six of the 11 process variables correlate significantly with achievement measures over the combined set of 90 classrooms:

Child self-learning (.423)

Adult informing child (.356)

Child asking questions (.321)

All positive affect (.306)

Child comments (-.298)

Adult asking thought-provoking questions (.238).

Five of these six correlations are positive. One, child comments, is negatively related to achievement, indicating that higher frequencies of child comments are associated with lower achievement scores. It is

Table 5

CORRELATIONS BY GRADE LEVEL BETWEEN SELECTED PROCESS VARIABLES AND MEASURES OF PUPIL ACHIEVEMENT, ATTITUDES TOWARD SCHOOL, AND DAYS ABSENT FROM SCHOOL

	Process or Outcome Variables	Achievement Variable				Affect Variable				Absence Variable			
		All (N=90)	K (N=39)	1st (N=39)	2nd (N=12)	All (N=90)	K (N=39)	1st (N=39)	2nd (N=12)	All (N=92)	K (N=39)	1st (N=39)	2nd (N=14)
Process Variables	1 Adult informing child	356*	203	212	309	004	-068	-175	-160	-029	398*	-004	-275
	2 Request--response	158	-330*	-162	320	005	-228	-243	132	-204	313	-153	-170
	3 Response--feedback	-081	-205	-180	470	-313*	-193	-399*	-315	216*	166	334*	-361
	4 Request--response--feedback	-171	-496*	-472*	435	-179	-237	-327*	-186	-012	183	033	-376
	5 Adult asks thought question	238*	177	099	136	136	018	058	048	-219*	-055	-124	-075
	6 Adult feedback	125	211	311	-197	042	214	-104	138	-071	-040	-262	-143
	7 Child self-learning	423*	536*	271	198	226*	295	042	117	-161	236	-258	-052
	8 Child asking questions	321*	404*	156	-159	405*	189	346*	504	-360*	-155	-336*	124
	9 Child comments	-298*	-096	-099	-562	076	145	244	169	045	-101	-145	333
	10 Motion	059	286	063	-567	166	114	172	-044	-196	-183	-217	183
	11 All positive behavior	306*	337*	395*	120	259*	329*	219	-017	-344*	-222	-359*	-279
Outcome Variables	12 Achievement (composite dependent variable)	--	--	--	--	528*	528*	432*	354	-440*	-288	-293	-686*
	13 Affect (attitudes toward school and learning)	528*	528*	432*	354	--	--	--	--	-397*	-425*	-172	-460
	14 Days absent	-440*	-288	-293	-686*	-397*	-425*	-172	-460	--	--	--	--
	Values of correlation coefficient for levels of significance p=.05	207	316	316	576	207	316	316	576	205	316	316	532
	p=.10	175	268	268	497	175	268	268	497	173	268	268	458

* Correlation coefficient significant at $p < .05$. Decimals have been omitted in coefficients.

Table 6

COMPOSITION OF SPRING 1971 TEST BATTERIES

Test Battery	Source
Kindergarten	Preschool Inventory
	Lee-Clark/NYU
	NYU Math Items
	WRAT
	Attitudes
First Grade (Entering)	Preschool Inventory
	NYU Items
	Lee-Clark and Sponsor
	WRAT
	Metro Readiness
	Attitudes
First Grade (Non-entering)	Metro Readiness
	Sponsor
	Miscellaneous Sponsor
	WRAT
	Attitudes
Second Grade	Metro Readiness
	Miscellaneous Sponsor
	SAT/MAT
	WRAT
	Attitudes
	TASC

notable that the dependent variable measure of affect (attitude toward school and learning) is correlated positively with achievement measure (.528) and that the number of days absent is correlated negatively with the achievement measure (-.440). These relationships indicate that high achievement scores, positive measures on the attitude scale, and low absence rates tend to occur together.

Two patterns of the correlations from one grade level to another warrant special attention. Each of these are variables in which the direction of the relationship at second grade is different from that shown for kindergarten and first grade, and the magnitude of the correlation is sufficiently large, even though not statistically significant, to be interesting. The two variables in question are (1) motion and (2) question-response-feedback. Taken together, these correlations suggest a shift from lower to higher grades in the style of instruction that is most effective. If the correlations shown for second grade classrooms were statistically significant, one would be tempted to say that exploratory activities by children in relatively unstructured settings are not functional for instruction of second grade children, whereas they appear to be so for kindergarten and first grade children. This finding is counter to the Bissel (1972) finding, which concluded that disadvantaged children achieved more in structured situations in their early years. The request-response-feedback variable is one component of the more structured educational models.

Subcolumns showing correlations for kindergarten, first grade, and second grade may be read and interpreted in a manner similar to the above. In studying the full table, it is important to remember the number of classrooms represented in the data base. The relatively small number of classrooms, particularly at second grade, should temper one's interpretations of the relationships shown.

The second main column in Table 5 shows correlations between process scores and measures of children's attitudes toward school and learning. Over all classrooms combined, four of the process measures correlate significantly with the affect variable as denoted by the asterists in the table. Three of these correlations are positive (child asking questions, all positive behavior, and child self-learning). This pattern indicates that exploratory activities toward the school environment. As had been the case with the achievement variable, the correlation between affect and days of school absence is negative.

The third main column of Table 5 shows correlations between the process variables and days of absence. Here, the pattern is dominated by negative correlations, with two important exceptions. In kindergarten

classrooms, the process measure of adult informing child is positively and significantly correlated with days absent (.398). In first grade classrooms, the process measure of response-feedback is correlated positively and significantly with days absent (.334). This indicates that children at the initial levels of their academic careers may tend to avoid formal instruction by adults.

Throughout the analysis, the variable with the most consistent effect on the outcome measures considered was: child asking questions. With a single exception (first grade achievement), it was related at all grade levels positively with achievement and school attitude and negatively with absence from school.

Relationships between teaching processes and child outcomes--analysis of extreme scores. — The question of relationships between process measures and pupil outcome measures was addressed by examining the mean differences on achievement, attitude, and absence measures for the kindergarten and first grade classrooms that were in the highest ten and the lowest ten on each of the process measures used in the preceding analysis. To perform these analyses, the distribution of scores on each 11 process variables was examined, and the highest ten and lowest ten classrooms in each distribution were selected for analyses. Four statistical tests were then applied to the resulting sets:

1. The mean difference between the high and low group on the process measure was tested using small sample t-technique.
2. The mean achievement scores for both the high and low groups were computed and subjected to a t-test.
3. A procedure similar to that for achievement was followed for the attitude measure and the days absent measure.

Results

Table 7 shows that significant differences were found on seven out of eleven variables between the ten high and ten low groups at both the kindergarten and first grade level. The variables adult asking thought-provoking questions (Variable 20), child questioning adult (Variable 27), and all positive affect on the part of children and adults (Variable 40) are related to achievement at both the kindergarten and first grade levels. This would indicate that it is important to establish an environment that encourages children to question. Further, kindergarten children achieve more when they are allowed to move around the classroom (Variable 68), and engage in self-learning (Variable 55).

Table 7

COMPARISONS OF OUTCOME VARIABLES ON CLASSES SCORING HIGH OR LOW ON PROCESS VARIABLES

Var. No.	Independent Variable	High/Low		Achievement		Attitude		Absence	
		Kgt.	1st	Kgt.	1st	Kgt.	1st	Kgt.	1st
16.	Direct request followed by child response	.001	.001	-.01	-.05	NS	NS	NS	NS
18.	Child response-adult feedback	NS	NS	NS	NS	NS	NS	NS	NS
16/18*.	Adult request-child response-adult feedback	NS	-.001	-.01	-.01	NS	-.01	-.05	NS
19.	Adult informing child	.001	.001	NS	NS	NS	NS	-.01	NS
20.	Adult asking thought-provoking question	.001	.001	.05	.01	NS	NS	.05	.10
27.	Child questioning adult	.001	.001	.01	.10	.05	.01	NS	.01
28.	Child self-expression	.001	.001	NS	NS	NS	NS	NS	NS
40.	All positive affect	.001	.001	.01	.05	.05	NS	NS	.01
53.	All feedback	NS	.001	NS	.05	NS	NS	NS	.10
55.	Child self-learning	.001	.001	.001	NS	.01	NS	NS	NS
68.	Movement	.001	.01	.05	NS	NS	NS	NS	.05

* Sequence of Variables 16 and 18.

Attitude scores toward school and learning measured at both kindergarten and first grade level (Table 7) were related to the variable child questioning attitude toward school and learning when they are free or encouraged to ask questions. When more positive behavior (Variable 40) occurs in classrooms, kindergarten children have a better attitude toward school. When first grade children are allowed to engage in more self-learning (Variable 55), they have a better attitude toward school and learning. If adults are more directive, as indicated by Variables 16/18, first graders are less likely to have a positive attitude toward school and learning.

The absence of children in kindergarten classrooms was greater where adults informed or instructed more often. Absence was also more frequent in classrooms where the adults were more directive (Variables 16/18). At the first grade level, absences were fewer in cases of children ask more questions (Variable 27) and where there was more positive behavior (Variable 40).

Conversely, when children were from the ten top classrooms where the adults were more directive, as represented in Variables 16/18, the children had lower scores on achievement at both kindergarten and first grade levels. Interestingly, these variables are components of the programmed/academic factor (see Follow Through report 1972), which is correlated positively with achievement.

It seems important to note that, when only the stimulus-response-feedback component is considered, the students' achievement is negatively affected, but when the components of small groups with several adults in an academic setting are added to the stimulus-response-feedback variable, there is a positive correlation with achievement. This would support several sponsors' views that, for the desired student achievement to occur, the total sponsor method must be used, not just a single component.

SUMMARY AND DISCUSSION OF MAIN FINDINGS

The primary emphasis in the analyses of classroom observation data was upon processes that characterize primary grade classrooms; these process variables were then examined for their ability to differentiate non-FT from FT and, among the latter, to differentiate among model sponsors.

Some attention was also directed to relationships between selected components of total processes and pupil outcome measures of achievement, attitudes toward school, and school attendance. In these latter analyses, classrooms were grouped by grade level but could not be subdivided meaningfully by FT sponsorship owing to the small number of classrooms in each classification.

Preliminary findings about relationships between processes and outcomes are suggestive and are supportive of the expectation that outcome prediction can be strengthened by considering process variables. Inferences from these findings to causal relationships between specific sponsored approaches and outcomes, are not however, warranted, for this part of the investigation did not classify classrooms according to sponsorship.

Differences in the Educational Experience of Follow Through and Non-Follow Through Children

The principal experimental question to which the FT evaluation was addressed was: were these "planned variations" effective in enhancing the social, emotional, and cognitive growth of children?

Among the important differences found between FT (all sponsored classrooms) and non-FT classrooms were the following. The FT children received more attention from adults when basic skills were being learned, since the children in FT were more often organized into small groups (see Table 9) where the aides as well as the teachers took responsibility for direct instruction. The FT classroom aides, having been trained by the sponsors to assist in the educational programs, often worked with one or two children, helping them to read, spell, and so on (see Table 10).

Table 8

OBSERVED DIFFERENCES BETWEEN FT AND NFT CLASSROOMS

	Variable	FT	Non-FT
42.	Adult/child ratio	X	
1.	A--Lunch, snack	X	
5.	E--Games, puzzles	X	
6.	F--Arts, crafts, sewing, cooking, pounding, sawing	X	
7.	G--Blocks, trucks, dolls, dress-up	X	
43.	Active play	X	
9.	Academic activities	X	
44.	Adult with one or two children in academic activites	X	
8.	Adult with small groups in academic activities	X	
45.	Adult with large group in academic activities		X
11.	Wide variety of activities	X	
10.	Independent child activities	X	
13.	Aide participating in academic activities	X	
52.	Thought-provoking question--child response--child elaboration	X	
30.	Adult communication focus--small group	X	
31.	Adult communication focus--large group		X
19.	Adult informing child		X

Table 9

AIDE UTILIZATION IN FT AND NFT CLASSROOMS

Aide Activity	FT*		Non-FT†	
	Mean	SD	Mean	SD
Aides with one or two children in academic activities	.028	.042	.004	.013
Aides with small groups in academic activities	.288	.258	.115	.090
Aides in management activities	.089	.102	.015	.022

Mean = Average over classrooms of number of recorded instances of aide participation in the manner specified divided by the number of COPs divided by the number of aides in classrooms.

*N = 97.

†N = 11: Only non-FT classes having an aide in the classroom are represented in these figures.

Even though a greater number of trained adults were available to FT children, the FT children were more often found operating independently in all activities. If independence, self-regulation, and autonomy are desirable skills to be learned, they are more likely to be developed in children when such opportunities occur in their primary school years. A study by Goldup (1972) using a modification of the SRI Observation reports that FT children demonstrated more self-control and fewer disturbing acts than did non-FT children when adults were out of the room.

Children in FT classrooms had a more interesting and varied educational program than non-FT children: FT children more often engaged in such activities as arts, crafts, cooking, sewing, carpentry, instructional games, and play with trucks, blocks, and dolls. If it is important, as some educational theorists postulate, that to grow cognitively children should have a variety of educational experiences where they can explore ideas, create objects, and manipulate materials, then on the average FT children have a definite advantage. In The Farther Reaches of Human Nature (1972) Abraham Maslow discusses the importance of education that offers children the opportunity to develop creativity. He states that, if our educational goals are to help our children reach their potential of becoming full human beings, we must help them develop creativity. With the rapid growth of knowledge, facts, techniques, and advances in technology, we need to consider a change in attitude toward the human being and toward his relationship to his world. Technology and knowledge are changing so rapidly that they are often obsolete before they are filtered down and taught in our schools. Living in this world of continuous change requires an individual who can change with the environment, drawing upon himself and his creativity to live his life with confidence.

It seems important that when thought-provoking, or open-ended questions were asked by adults, FT children more often elaborated their answers. This means that when a teacher asks, "What do you think, Bill?", Bill not only replies, he extends and describes what he means. This suggests that FT children not only respond to open-ended questions but can expand ideas as well.

Taba (1964) and Shaftel and Parsons (1967) report that the thought level of children is closely related to the question-asking characteristics of teachers. If children are asked to report memorized items, that is what they are likely to do; if children are asked to compare, contrast, generalize, or analyze, that is what they are likely to do. In the latter case, adults must listen carefully and allow time for the child to respond in a thoughtful fashion. This is what seems to be happening more often in FT classrooms.

The children observed who were not in FT classrooms experienced their instruction more often in large groups. They had fewer activities to enjoy and were less likely to act independently.

If we want to develop a citizenry where people can expatiate on ideas, be creative, make choices, and operate independently, it would seem important that opportunities exist for children to develop these characteristics in early years. According to our observations, FT classrooms provided such opportunities more often than non-FT classrooms.

Differences in Educational Approaches

From comparisons on both 68 selected component variables and a five-factor profile, there is convincing evidence that, although there are three main groupings, the nine sponsor approaches observed are different from each other. The differences observed are those that were predicted before the analysis of data, on the basis of knowledge of the sponsors' statements and their theoretical bases in the works of Piaget, Skinner, and Bruner. There is evidence that each sponsor is in part successfully implementing his program. This conclusion is based on comparison of the stated goals of the sponsor with the observed performance on selected variables.

Relationships Between Processes and Child Outcome

Examination of teaching process variables reflecting in part differing learning theories, gave the following findings.

When adults more frequently ask thought-provoking questions, children tend to have higher achievement test scores and a better attitude toward school and learning. When children ask more questions of adults, they have higher achievement test scores, a better attitude toward school and learning, and, in addition, they have a lower absence rate. These variables seem to describe an atmosphere of inquiry generated when the adults often ask children such questions as "What do you think?" In such an atmosphere, children feel free to ask questions of adults and to pursue ideas. Planning an environment to encourage children to ask questions seems to be significant in promoting academic achievement, positive attitudes, and better attendance rate. Flanders (1970) and Soar (1971) report similar relationships between teacher and student questioning behavior and student achievements.

When adults used a teaching format where a direct question or command was given to children with the expectation of child response or compliance, followed by some form of feedback, a negative relationship was found with

achievement in kindergarten and first grade. Further, the absence rate of children was greater where this question-response reinforcement process occurred with higher frequency. This, of course, is only one component of an educational method. For example, the performance of the University of Oregon model in terms of test scores is relatively high; yet this [redacted] component of that method, when viewed across all programs, is not positively related to achievement. In any case, the finding suggests that caution should be used in selecting particular components of educational models. Materials, methods, and organization of staff are all important and interdependent in ways yet to be clarified.

Positive affect, as it is coded on the Classroom Observation Instrument, on the part of children and adults is related to achievement test scores, attitude toward school and learning, and absence rate. This result suggests that, when people in the classroom are smiling and pleasant to each other, children also display a better attitude toward school, do better on achievement tests, and are absent less frequently. This finding is supported by the works of Christensen (1960); Fortune (1967); Kleinman (1969); Torrance and Parent (1966); Kline (1968); and Soar (1971). These authors report observation variables that might be characterized as positive affect, relating to measures of student achievement.

Overall, it is important to note that planning environments that are positive in affect and that encourage children to ask questions seems to be significant in promoting academic achievement, positive attitudes, and better attendance rate.

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